

HR-250 A Nondestructive Method for Determining Thickness of Sound Concrete on Old Pavement

Key Words: Concrete thickness, Pavement condition, D-cracking

ABSTRACT

The reduction in funds available for new highway construction has resulted in increasing emphasis being placed on maintenance and rehabilitation of existing pavements. This has in turn resulted in the need for testing equipment and cost-effective techniques that can nondestructively collect data on existing pavements to determine their present condition, predict the remaining life, and establish effective maintenance and rehabilitation programs.

A major problem affecting Portland Cement Concrete (PCC) pavements is severe joint deterioration. This joint deterioration manifests itself as corner cracking, offsetting of the pavement slabs at the joints, and the development of small cracks parallel to joints. A form of the latter, which has been observed not only at sawed joints, but also at random cracks and free edges of the pavement, has been given the name "D-cracking". D-cracking is believed to be a freeze-thaw induced failure of concrete, the severity of which has been associated with the durability of the coarse aggregate used for the concrete. The Iowa Department of Transportation (DOT) has established a relationship between the durability of the coarse aggregate, predominantly crushed limestone or dolomite, and the geographic location of the source from which it was obtained.

D-cracking appears to begin at the bottom of the slab. As deterioration increases the cracking expands both outward from the joint and upward from the bottom of the slab. Identification of D-cracking at the joints is currently done by core drilling each joint. Visual observation of D-cracking from the surface is not possible until complete joint failure occurs. Core drilling is a time consuming and expensive process. Therefore, it would be advantageous if a rapid, non-destructive technique could be found to locate and assess the subsurface pavement deterioration.

The primary purpose of this project was to assess the potential of a non-destructive remote sensing system, specifically, ground penetrating sub-surface interface radar, for identification and evaluation of D-cracking